update

UNITED NATIONS CENTRE FOR SCIENCE AND TECHNOLOGY FOR DEVELOPMENT

No. 42/Summer 1990

Bergen Conference Presses Case for Sustainable Development

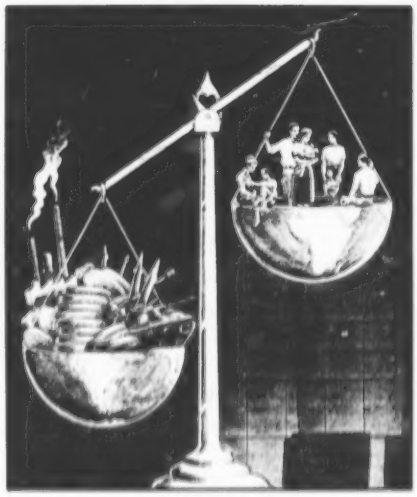
Government Ministers from 34 countries of the European Community met in Bergen, Norway, from 14 to 16 May to expand the dialogue on sustainable development.

The meeting was the second held at the inter-ministerial level to follow up on the landmark report of the World Commission on Environment and Development, and it tackled a wide range of issues in workshops covering four themes: The Economics of Sustainability; Sustainable Energy Use; Sustainable Industrial Activities; Awareness Raising and Public Participation.

Prevention is better than cure

In their final conference declaration, the Ministers said that policies towards sustainable development must be based on "the precautionary principle".

"Environmental measures must anticipate, prevent and attack the causes of environmental degradation", they said. "Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation...We invite the international science community to contribute towards the advancement of sustainable development policies and programmes. Scientific analyses and forecasts are especially needed to help identify longer-term policy options."



Jean-Francois Attaux

Environmental accounting

Noting the "symbiotic nature of economy and the environment", the Ministers discussed ways in which national accounting systems might reflect the importance of natural resources as "depletable or renewable assets". And with this in mind they urged the United Nations to accelerate its work on natural resource accounting. Prices should reflect environmental costs, they said, and they suggested that regulatory approaches include such things as:

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ATAS News—Special Issue—Saarbrücken Conference

France Will Host LDC Conference

Economic projections for the Least Developed Countries (LDCs) in the 1990s are far from promising. The Substantial New Programme of Action, which was developed at the 1981 United Nations Conference on LDCs, struck obstacles at national and international levels, and the inhabitants of the world's poorest countries found themselves worse off at the end of the decade than when they entered it.

The plan to reactivate LDC economies remains valid but the main problems which thwarted them persist. A

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A Climate for Development?

Human activities are changing the Earth's atmosphere.

Growing energy use, and the resulting atmospheric buildup of greenhouse gases related to global warming, threaten the world as we know it and the development prospects of future generations.

Policy issues and technological options associated with global warming were the subject of an international Conference on Energy in Climate and Development in Saarbrücken (28-31 May). The Conference was organized by CSTD with the support of the Ministry of Research and Technology of the Federal Republic of Germany and the Ministry for Economic Affairs of the State of the Saar.

The Conference is the subject of a special issue of *ATAS News* (inside). ■

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Bergen Conference
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• Taxes on environmentally damaging activities and products, as well as energy-inefficient products;

• The reduction or elimination of subsidies to resource-intensive or environmentally damaging activities;

• Other measures, including emissions charges and fees and deposit refund systems, which would offer incentives to changes in production and consumption patterns.

The Ministers acknowledged that ECE member States have a responsibility to reduce their emissions of greenhouse gases and other wastes, and they suggested the introduction or updating of energy labelling systems for products and processing within the region.

Public participation

The Bergen declaration emphasized the need for the citizens of all nations to be well-informed and urged Governments to promote formal and non-formal education on environmental matters. It was important, the Ministers said, that students, as well as those already in the work-place, appreciate the connection between their areas of specialization and the best interests of the environment.

It was agreed that stakeholders in every economy should have access to information related to the health of their environment, as well as legal and administrative recourse when the environment was threatened. It was suggested that consumers be made aware of the environmental qualities of products in the marketplace through the use of environmental labels which carry up-to-date analyses of products and processes that drive the economy.

Approval

The Ministers also sounded their approval for increased capital and technology transfers to developing and Eastern European nations to help them meet their obligations towards the global environment. They urged donors and multilateral agencies to take into account the effect of debt-servicing burdens on nations' ability to follow sound environmental practices. And they recognized that different levels of economic and technological development within the ECE region itself presented obstacles to progress. But they also agreed to aim for the early completion—in 1991 if possible—of a Convention to promote further development of international environmental laws. ■

Gontran Netto

France will Host LDC Conference
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prolonged slump in commodity prices continues, protectionist barriers to third-world exports to industrialized countries remain, official development assistance is below 1981 targets and commercial loans have declined sharply. External debt levels and interest rates remain insurmountable.

Losing Ground

The share of LDCs in world markets declined during the 1980s, average per capita GNP fell from $220 to $200 in constant dollars and the number of nations in this impoverished category grew by 11. There are now 42 nations classified by the United Nations as LDCs, and their populations total 400 million. More than half the LDCs are in Africa (28), and the rest are in Asia, the Pacific, the Middle East and the Caribbean.

A Second Conference

Against this background the General Assembly decided to convene a second Conference on LDCs in Paris (3-14 September, 1990). Preparations for this Conference, as with the first, are in the hands of the United Nations Conference on Trade and Development (UNCTAD). UNCTAD's Secretary-General, Mr. K. K. S. Dadzie, will also act as Secretary-General of the Conference.

The Paris Conference has three main objectives:

—to review the socio-economic progress made by LDCs in the 1980s;

—to review progress with international support measures;

—to formulate and adopt national and international policies and measures to accelerate development in the 1990s.

Special Session

A Special Session of the United Nations General Assembly in New York (23 April–1 May 1990) provided some insight as to the possible direction of the Paris Conference. The Session was devoted to the subject of international economic co-operation and gave Member States an opportunity to voice their widespread disappointment with the 1980s as well as their hopes for the 1990s.

The Session was initiated by the group of 77 countries who felt that today's lessening of global political tensions might open the door to a more productive dialogue on development co-operation between industrialized and developing countries.

The Special Session echoed the sentiment that the 1980s had been a "lost decade" for development and that new initiatives were essential if the poorest nations were to extricate themselves from the low-growth trap in which they currently found themselves.

Technology Deficit

It was noted that while industrialized nations had used their technological advantage in the 1980s to establish competitive positions in world trade, technology transfers to the developing world had declined for two main reasons: most developing countries lacked the resources to import capital goods on their own initiative, and foreign direct investment had fallen, particularly in the heavily indebted nations.

The final declaration of the Session gave prominence to science and technology in the context of growing international concern about the state of the environment and the need for sustainable forms of development in rich and poor nations alike. The declaration noted, among other things, a pressing need for:

• industrialized countries and international organizations to help third-world nations develop endogenous

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Gontran Netto

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capacities in the areas of science and technology;

• industrialized countries to transfer financial resources and environmentally sound technologies to developing nations on concessional and preferential terms.

The declaration also noted a need to support the integration of Eastern Europe into the global economy and its institutions. While it was stressed that this should not detract from international development co-operation with the developing countries, it was felt that Eastern Europe could also be a dynamic trading partner and source of technologies for third-world countries.

"The Special Session, for the first time, emphasized endogenous, or home-grown, scientific and technological capacities, as distinct from earlier, almost exclusive, reliance on access to foreign technologies", said CSTD's Executive Director, Dr. Sergio C. Trindade. "The next International Development Strategy is expected to further elaborate and consolidate this major policy shift in science and technology." ■

Population Review

The quarterly journal *Population and Development Review* is offering subscriptions for $24 a year. The journal examines population dynamics and socio-economic change and has a readership of international scholars, students, development planners and policy-makers.

For further information please write to: The Population Council, One Dag Hammarskjöld Plaza, New York, NY 10017, USA. ■

Science and Technology and the Fourth Development Decade

The world enters the last decade of the 20th century with an extraordinary and potentially explosive combination of hope and despair.

A vastly improved international political climate, major social and institutional changes in the direction of greater political and economic freedom, steady economic growth in most of the developed and a few developing countries, and significant advances in science and technology, coexist with growing disparities between the rich and the poor, both between and within countries. Also evident are increasing social demands throughout the developing regions, a slowdown in economic growth aggravated by the crushing burden of debt in the Third World, and ominous threats to the environment at the global and regional levels.

Danger and Opportunity

The combination of "danger" and "opportunity" that characterize the word "crisis" in Chinese ideograms has never seemed more appropriate to describe the present international situation. The momentous changes in Eastern Europe and in East/West relations are but two of the many manifestations of a turbulent and uncertain world full of surprises. New opportunities to pursue development strategies have emerged as a result of changes in the political, military, economic, social, cultural, environmental and technological arenas, giving rise to fresh hopes for the 1990s.

However, most developing countries in Africa, Latin America and Asia face this new context with apprehension, concern and even despair. For these countries, the 1980s—the period of the Third United Nations International Development Strategy—has been a "lost decade", for incomes per capita at the end of the eighties stood at the same or lower levels than at the beginning. Moreover, if present trends were to continue, the nineties could be an equally difficult period for development efforts.

UNESCO

Three decades of exploration and dialogue in evolving international and national strategies have left valuable lessons regarding the scope for active intervention in promoting development. The United Nations international development strategies for the Second (1970s) and Third (1980s) United Nations Development Decades emphasized targets for economic growth, such as the annual rate of growth of gross domestic product (GDP), increases in GDP per capita, and sectoral production increases. In addition, in 1971 the United Nations Advisory Committee on the Application of Science and Technology for Development (ACAST) proposed a series of complementary measures and targets specifically related to science and technology for development.

Landmark

The adoption by the General Assembly of the Vienna Programme of Action on Science and Technology for Development in 1980, at the beginning of the Third United Nations Development Decade, constitutes an important landmark. This Programme of Action provides guidelines for national and international actions aimed at creating endogenous science and

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S&T and the Fourth Development Decade (Cont. from Pg. 3)

technology capacities in developing countries, at restructuring international S&T relations, and at improving the effectiveness of the United Nations system in achieving the two preceding goals. Furthermore, the Vienna Programme of Action suggested mechanisms to provide additional financial resources to support international cooperation in science and technology for development. However, for a variety of reasons, many of the recommendations of the Vienna Programme, mainly those at the international level, were not put into practice during the 1980s.

It has become increasingly clear that scientific and technological advances play a major role in creating the new opportunities and problems that the international community faces, particularly as the last decade of the 20th century begins. These advances facilitate enormously the free flow and exchange of ideas and information; alter the patterns of world economic interdependence, particularly in trade and finance; and provide the means to satisfy food, housing, education and other social demands. Indeed, the nations that prospered during the 1980s did so in large measure because of their willingness, political determination and social capacity and ability to harness the potential offered by advances in science and technology.

IDS Focus

Considering the new context of the development crisis with its accompanying dangers and opportunities, the International Development Strategy for the Fourth United Nations Development Decade focusses on: development for people, by seeking to mobilize the inventiveness and resourcefulness of individuals; achieving environmentally and socially sustainable development; unblocking and integrating the world economy, overcoming the debt crisis and exploring new roles for trade and finance in the development process; promoting joint and mutual interests in cooperation.

Each of these themes incorporates implicitly significant elements of science and technology policies and capabilities. The Advisory Committee suggests that the Fourth United Nations International Development Strategy (IDS) could be enriched by considering an S&T dimension in each of its components, and proposes accordingly that the new and enhanced role that science and technology play in the process of development be explicitly recognized. ■

From a Contribution of the United Nations Advisory Committee on Science and Technology for Development to the Preparatory work of the International Development Strategy for the 1990s.

Warming Threatens Coral Reefs

Marine scientists studying the coral reefs of Jamaica report a "bleaching" phenomenon which some warn is an early sign of global warming.

Reef-building corals depend on a symbiotic relationship with algae, which live inside their bodies, provide vital nutrients and generate spectacular brown, green and golden colorations. If coral animals are stressed by something in the environment, however, they expel the algae and reveal a white limestone skeleton.

This bleaching has begun to appear in 80 per cent of the corals along Jamaica's north coast, and Thomas J. Goreau, a scientist who is carrying on 40 years of marine studies by his father, the late T. F. Goreau, believes there is a link between bleaching and rising water temperatures in the Caribbean. Thomas J. Goreau and colleagues at the Discovery Bay Marine Laboratory, University of the West Indies, reported mass bleachings in 1987 and again in 1989 following open water temperatures of more than 30 degrees centigrade. The normal maximum for the region around Jamaica is 29 to 29.5 degrees centigrade and the fear is that if higher temperatures persist, coral on the reefs will die, effectively wiping out reef-based fisheries and the region's diverse marine life. The loss of reefs would also deprive the islands of protection against storm-driven waves and do untold damage to the tourist industry. Goreau and his colleagues believe that reefs in the region were spared bleaching in 1988 by hurricane Gilbert, which ran the length of the Caribbean and cooled the waters in its wake.

In a letter to *New Scientist* in January, Goreau, who was also a Scientific Affairs Officer with CSTD, said he felt that unless climate change was halted immediately, the prognosis for Caribbean coral reefs, and eventually those of other regions, was "very poor indeed".

After a recent diving survey of the affected reefs off Jamaica, Goreau described a "ghostly" landscape. "It is as if suddenly it had snowed all over the reef", he said.

The same coral bleaching phenomenon has been reported recently off the coast of the north-eastern state of Pernambuco in Brazil. A group of researchers concerned with this problem organized an entity called GERPE to study the matter. The researchers belong to the Federal and the Rural Universities of Pernambuco and are led by Prof. Elga Mayal. ■

UNEP

—Special—
Energy, Climate, Development
Saarbrücken 1990

ATAS News

A Technology Assessment Supplement

No. 9/Summer 1990

Saarbrücken Conference Explores Energy Options for the Future

More than 150 experts from 36 countries met in Saarbrücken, Federal Republic of Germany, from 28-31 May to discuss the technological dimensions of energy systems and the impact of energy policies on climate and development.

The Conference addressed many of the choices available to nations as a buildup of greenhouse gases in the atmosphere threatens rich and poor with the potentially catastrophic consequences of global warming.

The Conference agreed on:

- the need for shared approaches to the control of energy emissions and the reversal of environmental degradation;
- the large potential for energy demand management and increased energy efficiency to reduce energy consumption, the use of fossil fuels and the emission of greenhouse gases;
- the need for developing countries to have access to environmentally sound energy technologies, as well as the endogenous capacity to effectively apply them;
- the need for creative financing for environmental protection;
- the importance of local solutions to local environmental problems;
- the special responsibility which industrialized countries have as the major polluters and sources of financing and technology;
- the need for quantitative targets for the abatement of greenhouse gas emissions to be included in an international convention, which should be adopted in 1992;
- the need for caution with the nuclear power option.

While there was broad agreement on many points of concern, participants also observed that effective cooperation on a global scale would be possible only if remedial measures recognized the vast economic and social differences between countries and their capacity to respond in the global interest.

Capacity to respond

The Conference emphasized the fact that industrialized countries, which contributed the major share of pollutants to the earth's atmosphere, also had the technologies to reduce or eliminate them. They also had populations which were aware of environmental issues and were prepared to challenge policies which jeopardized public safety. It was noted that developing countries, while agreeing on the harmful consequences of greenhouse gas emissions, were under pressure to meet the economic and social demands of sometimes large populations and were not in a position to make drastic changes in their patterns of energy use in the immediate future. As expected, the Conference also provided useful material for the exercise on environmentally sound technology assessment (ESTA) (see Update #41).

Enquête Commission

Special reference was made to a report of the Enquête Commission on Preventive Measures to Protect the Earth's Atmosphere. The Commission, which was appointed by the Parliament of the Federal Republic of

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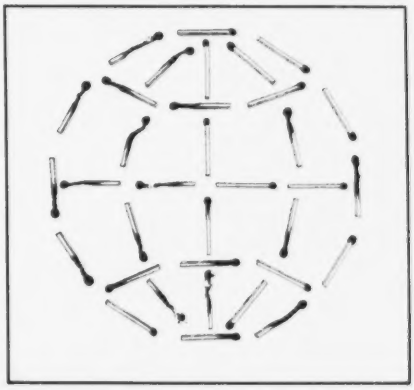

Highlights from Saarbrücken

While exploring ways of reversing the harmful impact of human interaction with the environment, the Saarbrücken Conference on Energy in Climate and Development paid special attention to the developmental perspectives of third-world countries.

Although there is general agreement between rich and poor nations that environmental issues transcend borders, the reality is that the world's poorer nations have a limited capacity to contain the major damage currently being inflicted on the earth's atmosphere by large-scale emissions of CO_2 and other greenhouse gases. Global warming is an international issue, but it is the richer nations of the world who are the major polluters, and it is they who have the technologies and other resources to respond most effectively. Many participants were anxious to know when, and by what mechanisms, the industrialized nations would share their technologies and resources so that poor countries with rapidly expanding populations could satisfy their need for industrial devel-

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Energy Options for the Future
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Germany, concluded that industrialized nations should reduce their CO_2 emissions by 30 per cent by the year 2005 and by 80 per cent by 2050—a finding which goes significantly beyond objectives established by the 1988 Toronto accord. The Toronto accord asked all countries to reduce CO_2 by 20 per cent by 2005 and by 50 per cent by 2050. The Enquête Commission, however, recommended that in light of the developing world's lower production of greenhouse gases and their limited access to clean technologies and resources, industrialized countries should compensate by shouldering a greater share of the burden for solutions to global warming. This would contain the major sources of greenhouse gases while allowing developing countries some growth in present levels of energy consumption.

Working Groups tackled three main energy technology areas as well as policy issues and options. The technology areas were large energy systems, small energy systems, and transportation systems.

Large Energy Systems

Improvements to the efficiency of large energy systems and the implementation of consistent energy demand management policies were seen to be the main tools for environmental damage control. It was recognized that systems based on nuclear and renewable energy sources would have growing priority, but the Working Group called for a moratorium on the expansion of nuclear energy until a new generation of high-safety generators had been developed. Citing the experience at Chernobyl, the Working Group felt that independent international inspection was needed for all plants currently in use or under construction and that nuclear reactors which did not meet adequate safety criteria should be shut down as soon as possible. The group recommended increased scientific and technological inputs to renewable sources of energy, such as hydro-, solar and wind power, but felt that the development of hydropower should also be subject to environmental impact assessments.

Small Energy Systems

In its final paper, the Working Group stated that although renewables had an "interesting" potential to reduce greenhouse gases, they could also have negative environmental effects. Participants noted that large tracts of land were needed for large solar and biomass energy systems, and that wind energy converters could be noisy.

The development of solar cells was said to be progressing well, but problems associated with the conventional aspects of the overall system had not been solved. The Group was doubtful that the cost of solar and wind energy systems could be sufficiently reduced by 2020 to make them viable on a global scale. Mini-hydro was rated economically attractive but subject to high start-up costs and possibly a dependency on foreign exchange. Biomass systems on family or village scales were considered both important and feasible, but problematic on a scale which demanded large plantations for feedstock.

Transportation Systems

The Working Group concluded that technology alone would not solve the emission problems associated with various forms of transportation. It was noted that transportation was a growth industry in many countries and would also have to be examined from such angles as fuel choice, mode, life-style and urban planning.

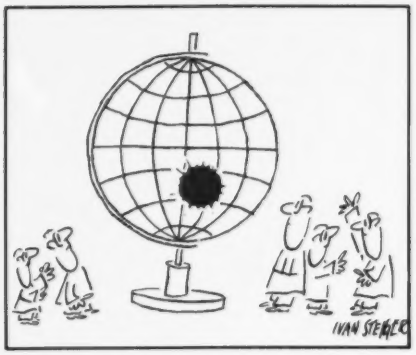
An area which had not been covered in earlier meetings was air travel, which in ton-miles of passengers and freight is expected to double over the next decade. In discussions aimed at levelling off emissions of CO_2 and NOX, discussion focused on liquid hydrogen as a promising long-term fuel option and high-speed rail networks as an alternative to inefficient short-haul flights.

Three other working groups directed their attention to policies based on cost-benefit considerations, development and regional equity at national and international levels, and harmonization.

Cost-benefit Considerations

There was strong agreement that classical cost-benefit analytical methods were inadequate for addressing the complexity of policy responses to climate destabilization.

The Working Group observed: "In addition to the monumental uncertainty in estimating the costs of such phenomena as loss of marginal agricultural lands or rising sea level, the nature of global climate change makes it practically impossible to identify boundaries for cost-benefit analyses which are relevant to policy jurisdictions.



Frankfurter Allgemeine Zeitung

In discussion on the role of prices versus regulatory action, some felt that ways must be found to translate the costs into monetary terms so that factor prices can be adjusted in such a way as to bring about desired changes in behaviour.

Development and Equity

The Working Group examined a range of inequities and policies to redress them, but given limited time, it focused mainly on international issues which were considered to be the most urgent and complicated.

A number of participants expressed the view that the environmental challenge called for a fundamental change in North-South relations. Particular attention was paid to the role of international monetary organizations, such as the IMF and the World Bank, and some participants mentioned the regional development banks. It was suggested that in spite of progress there was inadequate environmental consciousness in these organizations. There was a need, according to some, for a readjustment of traditional thinking to accommodate the cost of environmentally sound technologies in national energy policies and development projects.

The Working Group was in general agreement that the debt crisis was a major impediment to the developing world's engagement in environmentally sound policy decisions.

Harmonization

Given time constraints, the Working Group confined itself largely to discussion of harmonization within the context of the United Nations family. The view was expressed that the United

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Energy Options for the Future
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Nations structure was sufficient to address questions of climate and development, but that there was a need to overcome the present fragmentation of the system in this area. It was felt that this would be necessary if the United Nations were to play a leading role in the implementation of global action. The view was also expressed that there was a need for scientific coordination within the system.

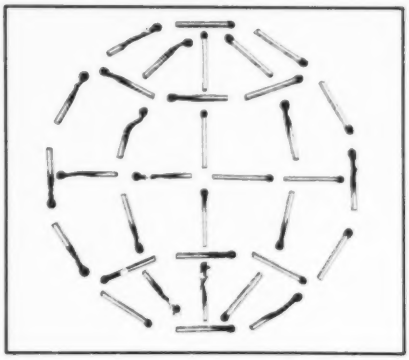
Follow-up

The Saarbrücken Conference is expected to contribute to the Nairobi meeting of the preparatory committee (August 1990) for the 1992 United Nations Conference on Environment and Development as well as other conferences, including the **Second World Climate Conference, to be held in Geneva (29 October–7 November).**

The discussions in Saarbrücken also inspired a Chinese proposal to host a conference on clean coal technologies in the spring of 1991.

The Saarbrücken Conference was organized by the Centre for Science and Technology for Development with the support of the Ministry for Research and Technology of the Federal Republic of Germany and the Ministry for Economic Affairs of the Saar. It was the concluding event of the ATAS exercise on energy technologies and development and will be an integral part of the *ATAS Bulletin* on "Environmentally Sound Technology Assessment" (ESTA).

In contrast with earlier conferences of this kind, the Saarbrücken meeting had a strong third-world representation. There was also an even distribution between government, acadaemia and the industrial sector. The United Nations system was represented through CSTD, ECA, ECE, ICAO, ILO, IMO, UNCTAD, UNDP, UNEP, UNESCO and WMO. ■



Highlights
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opment without jeopardizing national and global environments. Some observed that even with liberal access to clean technologies and funding it would be necessary to strengthen the endogenous capacities of developing countries to make effective use of them. It was also noted that developing countries would need help to develop their research and development capacities, together with policies which were consistent with global objectives.

The Conference placed the climatic implications of energy in context by noting that 50 per cent of atmospheric damage is currently caused by the generation and use of energy—80 per cent of which is related to CO_2 emissions. The Conference also stressed the importance of technological choices in the energy equation. There was broad understanding among participants that energy technologies which are already feasible can provide significant responses to global warming and climate change. The issue is how to make those technologies available to all countries.

The Enquête Commission of the Federal Republic of Germany made the very significant point that industrialized countries could meet objectives for the containment of greenhouse gases without sacrificing economic growth. According to the Commission this could be achieved by further improvements in energy efficiency, savings in consumption and increased use of new and renewable sources of energy.

Chinese initiative

All participants welcomed an initiative by Chinese representatives to organize, with the support of the United Nations system and industrialized countries, a conference in China focused on environmentally sound coal technologies and their application under local conditions. China is the world's largest producer of coal, and 70 per cent of its energy use is based on coal combustion with a very low degree of efficiency. CSTD will explore the possibility of introducing this conference into its work programme in 1991 and of mobilizing the necessary extrabudgetary funds.

The Conference attached special importance to the role which the United Nations Secretary-General could play in harmonizing the efforts of UN agencies towards environmentally sound development. And participants voiced strong support for the Intergovernmental Panel on Climate Change (IPCC), which is working to develop an international convention which quantifies targets for the reduction of greenhouse gas emissions. It is hoped that a draft international convention to protect the earth's atmosphere will be available for discussion at the United Nations Conference on Environment and Development, to be held in Brazil in 1992.

It was also agreed that multilateral efforts and mechanisms should be strengthened in the areas of environment and science and technology for development, and in this respect the Saarbrücken Conference was a significant contribution to preparatory work for the Brazil Conference. It also made a valuable contribution to final preparations for the *ATAS Bulletin* of CSTD on "Energy Technologies and Development". ■

ESTA

ENVIRONMENTALLY SOUND TECHNOLOGY ASSESSMENT

Congress

The Second European Congress on Technology Assessment will be held in Milan, Italy from 14-16 November. The subject will be 'People and Technology'.

For further information contact: Ms. Lene Hove, EEC DG X11, Monitor/Fast, 200 Rue de la Loi, B-1049 Brussels Belgium. Fax: + 32 2 2364299.

Participants at Saarbrücken Appeal for Global Responsibility

Speeches and other contributions from developed and developing countries sounded many common concerns at the Saarbrücken Conference on Energy in Climate and Development, and they stressed the urgency of a truly global effort to reduce the emission of greenhouse gases responsible for global warming without sacrificing economic growth, particularly in developing countries.

Major speakers and contributors included: the Minister of Research and Technology of the Federal Republic of Germany (Dr. H. Riesenhuber), the Minister of Public Works and Environment of Luxembourg (Mr. Alex Bodry), the Saarland Ministers for Economics (Mr. Hajo Hoffmann) and Environment (Mr. J. Leinen), the Minister of Science of Poland (Prof. Amsterdamsky), the Minister of Environment of Uganda (Mr. Moses R. Kintu), the Minister of Power of Pakistan (Mr. Syed Zafar), Mr. J. Ripert of France for IPCC/developing countries, Dr. G. Dorin (OECD), Dr. M. Roma (EEC), Academician Scheindlin, Executive Director of the Moscow International Energy Club, Mr. Bernd Schmidbauer, Member of the German Parliament and Chairman of the Enquête Commission on Preventive Measures to Protect the Earth's Atmosphere (Federal Republic of Germany), Prof. E. E. Galal of the National Society for Technology and Economic Development (Egypt), Daniel Gamachu, Addis Ababa University (Ethiopia), Dr. Rajendra Kumar, (Bhopal, India), XIA Shaowei, LI Weigang, QIN Zhigang, Qinghua University (Beijing, China), Prof. LING Peihong, Director, China Coal Society (Beijing, China), Mohamed Lwoya Baraka, Caltex Oil Ltd. (Nairobi, Kenya), Senator Jean-Pierre Masseret (France).

The following highlight some of the key points made:

Dr. Heinz Riesenhuber, Federal Minister for Research and Technology (Federal Republic of Germany), stressed the need to develop and use CO_2-free sources of energy, such as natural gas, solar power, nuclear energy and, ultimately, nuclear fusion.

Dr. Riesenhuber called for a strategy against climate change through the enhancement of climatic and atmospheric research (modelling and climate impact assessment).

Mr. Hajo Hoffmann, Minister for Economics of the State of Saar (Federal Republic of Germany), offered evidence of his Government's efforts to "think globally and act locally".

Mr. Hoffmann said that as a result of recent local policy action, atmospheric pollution caused by energy generation had decreased by 15 per cent in his state.

Prof. E. E. Galal of the National Society for Technology and Economic Development, Cairo, Egypt, stressed the interdependency of rich and poor nations on solutions to global warming. He said that marginal or placatory measures would not be sufficient to erase the threat of climate change, and only the equitable global sharing of responsibilities and the promise of shared benefits would motivate the effort required. He said that neither side could impose solutions that shifted responsibility to the other. Nor could they monopolize the benefits. In that sense, he said, the threat of global warming might be the first historical opportunity for humanity to translate the ideals of common welfare and security into reality.

Mr. J. Leinen, Minister for Environment of the State of Saar, criticized the excessive consumption of natural resources, and of energy in particular. He said that industrialized countries had a special responsibility to reduce per-capita energy consumption and greenhouse gas emissions without delay.

Mr. Bernd Schmidbauer, Chairman of the German Parliament's Enquete Commission for the Protection of the Earth's Atmosphere, demonstrated ways in which a 30 per cent annual reduction in CO_2 combustion could be achieved by the year 2005 in the Federal Republic of Germany. He outlined the various areas in which CO_2 emissions could be reduced by shifting the weight of current resource use, by savings in energy consumption and by greater energy production efficiency.

Mr. Daniel Gamachu of Addis Ababa University, Ethiopia, said the control of human and livestock populations to reduce pressure on land resources and improve per capita income was a long-term solution to the energy crisis as it affected the poor non-oil-producing nations of tropical Africa.

Academician Scheindlin, Executive Director of the Moscow International Energy Club, pointed out that nuclear power could be considered an option, but not until one in every 10 nuclear power plants was closed for reasons of safety. He feared that another accident on the scale of Chernobyl would mean the end of the nuclear option.

Prof. LING Peihong, Director of the China Coal Society (Beijing, China), said that his country had the third largest energy system in the world and laid equal emphasis on exploitation and conservation. He said that if China could achieve the coal-burning efficiency of the Soviet Union it could reduce its combustion by 50 million tons a year. It could also be a world leader in the generation of hydroelectric power, but currently exploited only 8.6 per cent of its potential. ■

ATAS News is a regular supplement to the *Update* newsletter of the UN Centre for Science and Technology for Development (UNCSTD). Its objectives are to inform scientists and planners of CSTD's activities in technology assessment (TA), to serve as an information medium for the ATAS Technology Assessment Network (TAN) and to highlight the implications of new technologies for developing countries. *ATAS News* offers readers an open forum to address these and related issues at the national, regional and international levels. Submissions for publication are welcome.

Newsworthy articles, special reports, and photographs and other illustrative material should be sent to: ATAS Cluster, UNCSTD, 1 U.N. Plaza, N.Y., N.Y. 10017, USA. Telex 232422 UNHUR and 62450 UNATIONS. Cable, UNATIONS NEW YORK. Telefax (212) 9634116.

ATAS News is edited by Ian Steele. ■

Social Order and the Environment

By Amilcar Herrera

The response of the international community in the 1990s to a growing case-load of environmental problems could have a profound impact on life as we know it in the next century. Unless we are well on our way to restoring humankind's balance with nature by the year 2000, our future as a species will be in jeopardy.

The main obstacles to an equilibrium with nature are not material. We have enough of the necessary scientific and technological know-how to change our ways. The main obstacles are social, political, cultural and institutional. A global society which is ecologically sustainable over the long term will require a major transformation of the present social and international order.

As an indication of the type and magnitude of the changes necessary, one needs to consider two main determinants of the environmental crisis which confronts us. The first is the dramatic change in societies' relationship with the environment. The second is the development of a global economy.

Economic foundations

Until modern times all societies were based essentially on peasant economies. Despite the political, social and cultural importance of cities, the great majority of the surrounding populations were rural, with economic foundations based on agriculture and livestock raising. Productive systems were devoted to the satisfaction of basic needs and survival was dependent upon local production. The relatively small urban populations which were not directly engaged in primary production were dependent upon the peasants' capacity to generate a surplus and, unlike economies of today, there was no neat separation between producers and consumers. Production was local and any change in production efficiency had a direct and immediate impact on the producer and the consumer. Accordingly, there was an easy consensus, based on very direct personal experiences, that any practice which could have a serious negative impact on the ecological equilibrium had to be corrected quickly.

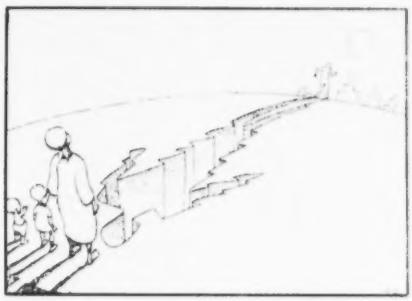
Market forces

With the industrial revolution and the emergence of capitalism came a steady separation of producers and consumers, with production responding to market forces hundreds and sometimes thousands of miles away. Feedback was less direct, and concern for the productive environment became less personal. As direct accountability for the environment has slipped, societies' processes to correct environmental damage have also become more complicated. Societies' concerns and the interests of productive enterprises today are very often divergent. For the enterprise, any regulation to protect the environment usually means an increase in the cost of production—something which producers attempt to avoid by impeding or evading regulations.

The internationalization of the economy has also eroded the bond which producers and consumers felt when their interests were so closely linked to a shared environment. The ability to import raw materials from countries of the developing world or to locate production processes abroad has pushed concern for environmental impact to the periphery. Industrialized countries have been able to consume most of the goods produced without experiencing or being reminded of the damage which can be done.

Globalization

Both processes—industrialization and the development of a global economy—coupled with an enormous acceleration of technological development, have destroyed almost completely the direct feedback mechanisms and processes of accountability between society and the physical environment. As a result, measures to control that relationship are usually taken too late and with too little efficiency to contain or correct destructive processes before damage is irreversible. Added to this is the growing inequality between nations and their peoples. The economic and technological gaps which separate developed countries from the industrialized world have never been as great.



At the beginning of Western expansion the average material standard of living in the colonized world was not much lower than that of European countries. Today, the difference measured in material consumption is in the order of 15 to 1. Equally significant is the qualitative change in living standards. Just prior to the Second World War the development objectives of both central and peripheral countries were to some extent similar.

New Concerns

Today, as the central countries enter what is being called the "post-industrial" age with a new set of concerns and objectives, the peripheral countries are still striving to satisfy very basic needs long taken for granted in the industrialized countries.

We are currently faced with the paradox that although the degree of interdependence between nations at all levels has never been closer—both economically and environmentally—the character of the dialogue between richer and poorer countries is becoming more difficult by the day.

The narrowing of these gaps presents a formidable challenge, but our future as a species depends on our capacity to confront it. ■

Professor Amilcar Herrera, from Argentina, is currently with the department of science and technology policy of the Campinas State University in Brazil. He is the lead co-author of *Catastrophe or New Society, a Latin American World Model.*

Creative Financing Sought for Sustainable Development

For developing nations the road to sustainable development is bound to be a bumpy one. Environmentally sound technologies can be costly, and for countries already burdened by debt and the need to compete in international markets, it will not be easy to pass on the cost of cleaner production to consumers.

To remain economically viable, third-world manufacturers would appear to have only three options: to seek financial support from already overburdened Governments, to go further into debt with foreign lenders or to reduce their commitment to a clean environment. For many, the choice between economic survival and pollution is painfully obvious.

If the world is to have a truly universal effort to clean up the environment, it is inevitable that somewhere along the way compromises will have to be made for the transfer of cleaner technologies to those who lack the economic and technical capacity to make real choices. At the same time, efforts must be made to build endogenous capacities in these countries to enable them to make such choices in the future.

Seminar

A seminar to address these and other challenges to sustainable development is being planned in Belém, Brazil (2-7 December), under the sponsorship of CSTD, the Brazilian Secretariat of Science and Technology, and Companhia Vale do Rio Doce (CVRD), a leading natural-resource concern.

The seminar programs will include a visit to a giant iron-ore mine of CVRD in Carajás. The company is proud of efforts it has made in the heart of the Amazon to minimize environmental disturbances as it pursues a business which elsewhere is notorious for its destruction of local ecosystems. CVRD has invited CSTD and a range of scientific experts as well as the international media to come and see for themselves.

The main purpose of the workshop, however, is to discuss creative financing arrangements which would make environmentally sound technologies available to developing countries. On the menu of possibilities to be explored are debt swaps for environmental protection and schemes to tax polluters.

Mining iron ore—Carajás, Brazil

Participants are likely to include representatives of the Brazilian Government; the World Bank; UNU WIDER; UNESCO; UNEP; FAO; the Inter-American Development Bank; the International Development Research Centre; the Stockholm Institute for Environment; SAREC; NORAD; USAID; the Rockefeller, Ford and MacArthur Foundations; selected third-world Government Ministers; and corporate leaders. Also on the list of invitees will be bankers, venture capitalists, legal experts and technologists. ■

Other People's Technology

A company based in New Jersey, USA, is selling guides to technology transfer opportunities and industry/university research partnering.

For further information please write to: Technical Insights, Inc., Dept. JJ1290, P.O. Box 1304, Fort Lee, N.J. 07024-9967, USA. ■

Guidelines For Waste Prevention

Hazardous wastes are routinely dumped into rivers, abandoned by roadsides or poured directly into oceans, threatening the health and safety of millions of people in developing countries.

Once dumped, these wastes often make their way into the food chain and water supply and can cause brain damage, cancer and chronic illnesses.

According to a new set of guidelines on hazardous wastes published by the World Bank for government regulators and industry specialists, the developing countries are producing less hazardous wastes than the developed countries but have a more serious problem with them because they have fewer controls on their disposal.

Mr. Roger Batstone, an industrial pollution specialist who co-authored the guidelines, says that in the developing world it is not uncommon to see drums full of hazardous waste being rolled into rivers, where they usually break open and spill into the water. Some of these wastes end up in fishponds, where they enter the food chain.

Hazardous wastes are generated from a variety of industrial and agricultural activities, Mr. Batstone explains. They may be solids, liquids or sludges and include heavy metals such as lead and cadmium, pesticide residues or other chemicals, such as those used in tanneries. These wastes are produced in almost every country, but the most serious problem is in the newly industrialized countries of Asia and Latin America, where industries sprang up before Governments had a chance to establish effective waste-treatment or disposal facilities.

According to the Bank, many countries, including Malaysia, Indonesia and Thailand, have started to tackle hazardous waste problems by enacting laws covering storage, treatment and disposal. But Mr. Batstone says that even those which attempt regulation often lack the capacity to enforce

(Cont. Pg. 7)

Waste Prevention
(Cont. from Pg. 6)

the laws or even to assess how much waste is being produced.

"If a Government can't enforce these regulations, you can be certain that the companies generating the waste are not going to be serious about sound waste management," he says. "Many countries simply look for the cheapest way to get rid of their hazardous wastes. This usually means that they pay a small fee to a hauler, who will carry it off and dump it along a highway or in a river."

The Bank maintains that serious damage to the environment has already occurred and that a lot of dump sites will have to be cleaned up, but Mr. Batstone says that with so much hazardous waste being generated, and in the absence of central waste-management facilities, the priority is to reduce the volume of waste produced at the sources. To do this, he says, Governments must provide incentives for industries to make more efficient use of the available resources, thereby generating a smaller volume of hazardous wastes to deal with.

Mr. Batstone says that the World Bank is working with a number of Governments to set up industrial development projects which generate fewer hazardous materials and is helping such countries as India, China and the Philippines to develop environmental protection projects which cover waste-disposal issues. He says that immediate action to control the production of hazardous wastes can save money. "Cleaning up a hazardous waste dump site can cost 100 times more than it does to manage the waste properly at the outset. Waste prevention pays."

Copies of the guidelines, "The Safe Disposal of Hazardous Wastes: the Special Needs and Problems of Developing Countries", are available for $24.95 from the World Bank Publications Department, Room J-2-194, World Bank, Washington, DC 20433, U.S.A. ■

Seminar

A seminar on clean production technologies will be held in Canterbury, England (17-20 September).

Staking a Claim in Professional Life

As the founder and principal partner of a consulting engineering firm in Nigeria, Joanna Olutunbi Maduka finds that professional life for women in the marketplace can be lonely at times.

"Most of my dealings in the Government Ministries and in the private sector are with men", she said during a recent visit to CSTD. "But these days they don't mind women as much as they did in the 1970s, when I started. It was very rough to start with. As yet we have no women in the decision-making positions in engineering departments of the Ministries, so most of the people who can give you jobs are men."

When Mrs. Maduka founded her company, Leicom, in 1970, she was the first woman in Nigeria to have an engineering consultancy. She had been a lecturer in electrical engineering at the University of Ife, Ibadan campus, when a decision was made to transfer the university to Ife, its permanent site, some 80 kilometres from Ibadan. With her husband in Ibadan it became too difficult to teach in Ife and maintain two homes, so Mrs. Maduka decided to set up shop in a small space in her home in Ibadan.

First contract

Her first contract was with an architect who was renovating a pharmacy shop, but little by little the scale of her operations grew, and today Mrs. Maduka heads a firm of 25 people providing building services for the construction of hospitals, schools, office buildings, hotels and markets. About 70 per cent of Leicom's work is for the Government, which in 1982 commissioned her for a proposed new $200 million office complex for the Ministry of Finance in the new Federal Capital.

Mrs. Maduka has expanded her business interests to include a garment factory and has also found time to serve in a number of capacities in the public and private sectors and with charitable organizations, including Soroptimist International and the Better Life Programme for Rural Women. The Better Life Programme is headed by Nigeria's First Lady, and Mrs. Maduka is in charge of projects for rural industrialization and income generation for women in the private sector.

Mrs. Maduka

Mrs. Maduka was the first woman elected Fellow of the Nigerian Society of Engineers, and the first woman elected Fellow of the British Institution of Electrical Engineers in the West African subregion. Last year she was elected as the Third Vice President of the Nigerian Society of Engineers. She is Founder and President of the Association of Professional Women Engineers. She is also a member of a committee established by the federal Government to commercialize the State-financed Electric Power Authority, a Board Member of the Nigerian National Petroleum Corporation and a member of the Governing Council of a State University of Technology.

Mrs. Maduka is a new member of the United Nations Advisory Committee on Science and Technology for Development and was in Zhuhai, China, for its Tenth Session (2-10 April). ■

IIASA Research Programme

The International Institute for Applied Systems Analysis (IIASA) has developed an international environment programme to investigate the interaction of human development activities and the environment.

For further information please write to Professor Bo R. Doos, Deputy Director and Leader, Environmental Programme, International Institute for Applied Systems Analysis, A-2361 Laxenburg, Austria. Fax: (0 22 36) 71313. ■

University Appointment

Dr. M. Anandakrishnan has been appointed Vice-Chancellor of the Anna University in Madras, India.

Dr. Anandakrishnan, who was Deputy Director of CSTD until his retirement last year, succeeds Dr. V. C. Kulandaiswamy.

Anna University is one of India's leading institutions devoted to science and technology and has a faculty of about 500 people. It has 5,000 students, including about 1,500 postgraduate students, and has international bilateral and multilateral support for many of its programmes.

Dr. Anandakrishnan took office in May. His appointment is for three years. Dr. Anandakrishnan can be contacted at: Anna University, Madras, India 600 025 Fax: 91 44 417299 ■

New Members of Advisory Committee

An extraordinary session of the Intergovernmental Committee on Science and Technology for Development (IGCSTD) was held in New York on 13 June 1990 to appoint the following 14 members of the Advisory Committee on Science and Technology for Development for 1991-93:

Amin Badr-El-Din (Jordan); Donatien Bihute (Burundi); Niels E. Busch (Denmark); Robert G. Jones Butler (Ghana); Meleneo J. Carlos, Jr. (Philippines); Pierre Castillon (France); Hyung Sup Choi (Republic of Korea); Mohammed Kamel (Morocco); Ladislav Kovac (Czechoslovakia); C. N. Geoffrey Oldham (U.K.); Daniel Resendiz Nuñez (Mexico); Rosa Elena Simeon (Cuba); Alexandre P. Vladislavlev (USSR); and WU Yi Kang (China). Butler, Choi, Oldham, Resendiz, Vladislavlev and WU were reappointed for a second and last 3-year term.

The other 14 members who are continuing their terms of office are as follows:

Carlos R. Abeledo (Argentina); Dulce Arnao de Uzcategui (Venezuela); Elisabeth Birman (Hungary); Harvey Brooks (USA); Karl E. Ganzhorn (Federal Republic of Germany); Joséphine Guidy-Wandja (Ivory Coast); Seeiso Liphuko (Botswana); Joanna Olutunbi Maduka (Nigeria); Marcos Mares Guia (Brazil); Thomas R. Odhiambo (Kenya); Yash Pal (India); Maria de Lourdes Pintasilgo (Portugal); Yangze Sherpa (Nepal); Mikoto Usui (Japan).

The next session of the Advisory Committee is planned for mid-January 1991. ■

Missions to Viet Nam and Uganda

After years of war and conflict Viet Nam is turning its attention to reconstruction and development. It has placed technological self-reliance among the priorities on its economic agenda and has asked CSTD for assistance in formulating a coherent strategy to strengthen its endogenous capacities in this area.

A CSTD preparatory mission visited Viet Nam from 3 to 10 April and national policy dialogues will follow as a means of building consensus among the various stakeholders in the country's development process. These dialogues are expected to yield a portfolio of policies and projects for implementation. Once priorities are defined, CSTD expects that the portfolio will be used to mobilize resources at domestic, bilateral and multilateral levels to implement the initiatives contained in the portfolio.

Uganda

A CSTD mission with similar objectives visited Uganda from 13 to 20 May. The mission visited 25 Government, non-governmental and private sector bodies in preparation for national policy dialogues to help define national options and objectives for development.

Uganda is also emerging from a prolonged period of turmoil, and its industries are operating at just 40 per cent of capacity. A national steering committee representing a broad cross-section of stakeholders in the national economy will follow up on the mission by identifying development prospects for further study. Once studies have been completed by local consultants, the first of several rounds of dialogue will be held to establish agreement on a list of priorities worthy of funding.

Viet Nam and Uganda are two of six countries which are participating in stakeholders' dialogues promoted by CSTD in co-operation with FSTD-UNDP, with the support of the Federal Republic of Germany. ■

For further information, contact:

Centre for Science and Technology for Development
United Nations
New York, New York 10017
United States of America
Telephone: (212) 963-8435
Fax: (212) 963-4116
Update and ATAS News
Edited by Ian Steele

"...A periodic newsletter to keep national authorities, United Nations organizations and intergovernmental and non-governmental organizations informed of the progress made and related developments regarding the implementation of the Vienna Programme of Action" (IGC resolution 5(II)).

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—Special—
Energy Today & Tomorrow

update

UNITED NATIONS CENTRE FOR SCIENCE AND TECHNOLOGY FOR DEVELOPMENT

No. 43/Fall 1990

Council Announces Study on Energy for Tomorrow

The World Energy Council (WEC) has announced ambitious plans for a major policy document on "Energy for Tomorrow's World".

The undertaking aims to identify a realistic framework for resolving regional and global energy problems, taking into account the need for:

- sustainable sources of energy at costs acceptable to peoples at all income levels;
- optimal production and end use efficiency; and
- socially acceptable care and protection of the environment.

The WEC Commission will try to reconcile the many diverse views of energy stakeholders such as: suppliers, users, conservationists, and environmentalists, in defining and meeting energy needs. Announcing its plan in London (4 September) the Council recognized that many future energy scenarios already exist, or are in stages of preparation. But it noted there was "an obvious need for authoritative views and recommendations from the world's energy community" as a complement to the UN World Commission's Report on Environment & Development—"Our Common Future". WEC said that its Commission would not deal at length with further numerical analysis, but would seek to identify strategic options to achieve the best "practicable and balanced" framework for many of the world's regions. The horizon for the report is 2020.

Indonesian auto worker. Energy shapes his future

It is expected that a final draft report will be concluded by June 1992 in time for the United Nations World Environment and Development Conference to be held in Brazil. The Commission's preliminary conclusions would also be debated at the 15th WEC Congress in Madrid (September 1992) prior to publication in 1993.

A preliminary list of risks and possibilities identified for the Commission to examine includes:

—population growth;

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One U.S. energy view Pg. 7
Brazil's transportation fuels pg. 7
ATAS News — liftout supplement

ATAS Bulletin Examines oil Addiction

It has been painfully obvious since the early 1970s that the high cost of imported oil can cripple a developing nation's economy. It has been equally well known that increased energy consumption is essential to development and the improvement of living standards. And yet, little has been accomplished over the intervening years to reduce the sensitivity of developing economies to the vagaries of oil supply and pricing.

This is the sad but inescapable conclusion of CSTD's forthcoming ATAS VI Bulletin on "Energy Technologies and Development". The Bulletin, to be published later this year, is the product of four workshops and 75 technical papers containing inputs from almost 200 energy stakeholders from developing and developed countries. It is the sixth in a series of technical Bulletins produced by CSTD on subjects ranging from Tissue Culture to New Materials Technology.

(Cont. Pg. 2)

Film Preview

A documentary video, "Singapore in the Information Age—A Case Study of Science and Technology for Development", will be previewed at United Nations Headquarters on Tuesday, 20 November. The film will be screened under the auspices of CSTD, the United Nations Department of Public Information and the producer, Global Alliances Inc. ■

—economic growth;
—energy costs, intensity and efficiency;
—energy financing and investment policies;
—environment protection requirements;
—energy and public opinion;
—acceptability of different energy forms;
—conventional energy reserves;
—renewable energy sources;
—energy technology;
—energy pricing and regulation;
—institutional aspects of energy;
—social and societal impacts of energy;
—market evolution;
—security of supply.

Nine energy regions will be studied by individual regional groups drawn from WEC Member Committees. Although the report will be global it will have an accent on regional perceptions, and can be expected to reflect very large differences in the ways energy crises have impacted on the economic development of the industrialized and developing worlds.

The World Energy Council is a unique international multi-energy organization which is non-governmental and non-commercial. It has 90 national member committees and maintains a substantial ongoing programme of international energy studies. The most extensive of these was the 1975-1978 report "World Energy—Looking Ahead to 2020". Its most recent study—"World Energy Horizons 2000-2020" was presented to the 14th WEC Congress in Montreal late last year. It presented strategic thinking under three main headings: Uncertainties of demand; uncertainties of supply; and the geopolitical uncertainties confronting decision-makers in business and politics.

For further information please write to: World Energy Council, 34 St. James Street, London SW1A 1HD, England. Telephone: (44) (71) 930 3966. Fax: (44) (71) 925 0452. ■

New ATAS Bulletin
(Cont. from Pg. 1)

Papers prepared for ATAS VI illuminate the fact that since the 1973-1974 oil price hikes sent shock waves through the world economy, per capita energy consumption in the developing world has decreased and population growth has outstripped economic growth in many of the lowest income countries. This state of affairs has been exacerbated by continued deforestation which has made the subsistence energy needs of the world's poorest communities even more difficult to satisfy.

Oil products are essential for most transportation needs, and without oil much of the developing world would be without electricity. With less oil and higher prices for transportation, fuels and electricity, or both, economic production in the developing world would be strangled, causing higher rates of unemployment, increased prices for all goods and services, and a further erosion of living standards.

In the face of such realities it is disturbing to find that little or no progress has been made towards reducing the third world's dependence on oil. Gains in terms of conservation, or the development of renewable or alternative forms of energy in the nations which need them most, have been meagre indeed.

The ATAS VI Bulletin is obliged to ask: Where are the technologies which promised to bring heat and electricity to rural societies, and clean air and abundant energy to the cities?

Some excellent new technologies are available, and more are in the offing, but for reasons mainly to do with cost and societal responses, few of them can be found in operation anywhere in the developing world. The technologies which are in place are most often those which are highly inefficient.

Efforts by national Governments and by donors to develop non-petroleum energy sources in the areas of biogas, solar power, and wind energy have largely failed. There are some brilliant success stories, among them Thailand's development of natural gas and Brazil's development of alcohol fuels, but these are the exceptions.

Papers prepared for the ATAS VI Bulletin analyse individual experiences and offer much on ways of avoiding failure in the future. The essence of arguments presented is that technology assessment is crucial and must be set in the context of national and local energy planning. The papers note that reasons for the failure of energy projects in the developing world are seldom technological. Most fail for reasons which are institutional, social, and financial—in sum, for want of an endogenous capacity in energy technologies.

The Bulletin also contains information on how to conduct technology assessments, and may be used as a textbook. ■

Environmental Committee Meeting

The preparatory committee for the United Nations Conference on Environment and Development held its first substantive meeting in Nairobi from 6-31 August.

Participants expressed hope that the environment and development conference, scheduled to be held in Brazil in June 1992, would usher in a new era of international economic behaviour by moving environmental issues to the centre of the development process. It was agreed that the conference should focus on issues which clearly demonstrate the interdependence of nations and their need for international co-operation. These issues will include global warming and biological diversity.

Discussion at the Nairobi meeting highlighted the fact that industrialized and developing nations do not have an equal capacity to respond effectively to the challenges ahead. And the access of developing countries to environmentally sound and affordable technologies was one of the issues raised. It became evident during the meeting that the success of the 1992 Conference would very much depend on the extent to which it responds to such questions and agrees on concrete actions which developing countries can support. ■

Oil Market Developments Affect Deployment of New Energy Technologies

By Helga Steeg

For the third time in less than two decades, political instability and aggression in the Gulf region has focused attention on the impact on world economies which may result from developments in oil markets. It is already clear that lessons have been learned from past experiences. A substantial reduction in oil dependency as well as the development of strategic options for dealing with oil supply shortfalls have tended to dampen the economic disruption which might otherwise have taken place.

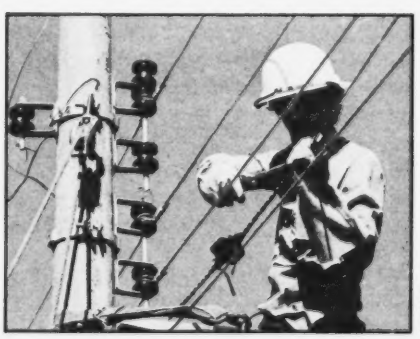
Concerns over the security of oil supply in the 1970s resulted in significant changes in the way energy is used. In particular this has influenced:

- a shift from oil use in electricity production and other end-use sectors;
- a progressive improvement in energy efficiency in the production of goods and services.

Those changes resulted from the availability of energy conversion and end-use technologies which could utilize non-oil based energy sources, improvements in the efficiency of existing energy-using technologies and better energy management techniques and the elimination of waste.

New life for alternatives?

One frequently asked question is whether the recent rise in oil prices, and the renewed uncertainty about the reliability of oil supplies, will provide a new impetus to the development and market penetration of alternative energy sources and technologies. There is no simple answer—not only because one cannot predict how long the current situation will last, or how oil prices will evolve thereafter, but also because the link between oil price increases and innovation in energy technologies is complex.



CESP

Aero-generator—Mexico

IIE

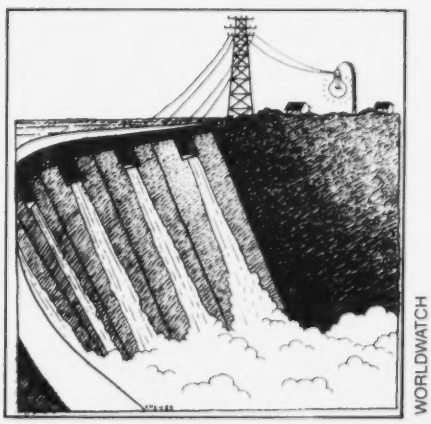
What matters is whether a new technology penetrates the market and displaces some older, less efficient or more polluting technology. The standard response of consumers to higher prices and uncertainty in supply is to seek ways of using less oil, or to find substitutes. But companies and households will spend money on oil substitutes or energy-saving equipment only if there is a good chance of a positive payback on their investment. Moreover, the penetration of new technologies will occur more slowly in periods of depressed economic activity.

Intensified research

The approach of member countries of the International Energy Agency (IEA) has been to encourage rapid implementation of the best available technology, e.g. the introduction of technologies resulting from past innovations which are now suitable for accelerated market penetration. The recent build-up of coal, gas and nuclear-based electricity generation capacity is an example of this. A second group of energy technologies has benefited from intensified research and development efforts. They include clean-coal technologies, highly efficient end-use devices such as heat pumps, and more efficient and less-polluting automobiles. A third group of technologies, still in the R&D stage, promise further improvements in energy efficiency and large reductions in environmental impacts. These include many renewable technologies such as photovoltaics, but also technologies such as fuel cells and advanced electric propulsion systems for automobiles. Renewable energy forms are likely to provide an increasing proportion of supply in IEA member countries over time, but they have yet to attain wide commercialization.

In summary the present world energy situation leaves little ground for complacency, though some satisfaction can be derived from the past success and continuing relevance of appropriate response strategies adopted by IEA member countries. The influence of market-based policies which stimulate innovation through competitive processes have brought great benefits by increasing the range of energy technology options. It is now up to Governments to continue their efforts to reinforce the climate which gives rise to those innovations, so that appropriate and timely solutions to the continuous challenges of energy security, economic growth and environmental protection may become available. ■

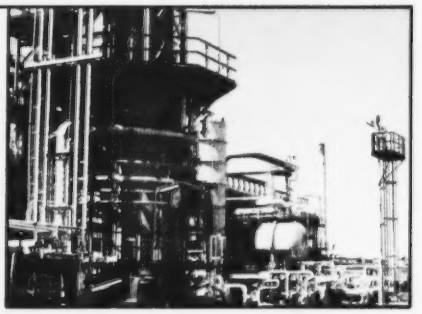
Helga Steeg is Executive Director of the International Energy Agency.



WORLDWATCH

Call for Co-operation and Understanding

By S. A. Al-Fathí



It is not easy to talk about the "oil crisis" of the 1970s when we are in the middle of another crisis, the duration of which is difficult to predict. No matter how the current situation in the Middle East is eventually resolved, it will undoubtedly have a profound impact on the oil scene for many years to come.

After two decades of instability in the world oil market, a more stable environment, mutually beneficial to both producers and consumers, was beginning to emerge before the present crisis erupted. Hopefully, and especially if the crisis is resolved by peaceful means, the optimism that was already appearing on the horizon will not dissipate.

Demand patterns change

Oil price changes in the 1970s intensified trends in conservation and substitution, and brought about structural changes in industrial production, from heavy to light, and service industries. This culminated in the decline of world oil demand (outside the former centrally planned economies) from 53.0 mb/d in 1979 to 45.9 mb/d in 1985 only to resume a moderate growth thereafter whereby it reached 51.3 mb/d in 1989. Similarly the supply map encompassed many changes as discoveries and developments from non-traditional areas had an impact on the market, particularly from the North Sea, Alaska and a number of developing countries. The price of oil up to 1986 not only encouraged and made these developments possible, but also maintained at a high level the production of other mature areas such as North America. With the collapse of oil prices in 1986 supplies from outside OPEC have somehow stabilized, and the perception is that they are likely to continue so for a few more years before gradually declining to a level that would leave OPEC to meet most of the future incremental demand.

The upward shift in oil demand since 1986 has been helped by low oil prices, which have been conducive to rapid growth in the world economy. The growth in oil demand, however, has made visible the underinvestment of the industry in the last decade. This is clearly demonstrated by the stabilization of supplies from outside OPEC and by the decline in OPEC production capacity to worrisome levels. Similarly, in the downstream refining and transportation sectors, the strains are visible from the high utilization factors that we see today. Without stability and understanding between producers and consumers, new investment may not be undertaken in time, thus putting pressure on the supply situation and contributing to additional instability and difficulties, particularly for the developing countries. These countries, as opposed to the industrialized nations, have limited flexibility in fuel switching, conservation and substitution, and oil remains their main energy source for economic development.

Technological innovations have increased energy efficiency in the industrial, household and transportation sectors. They have also made energy supplies more available through improved exploration techniques, reservoir engineering, enhanced oil recovery and drilling. Such technological innovations may in fact reduce the rate of decline of oil production in regions outside OPEC.

Oil's share declines

Market forces were not the only factor affecting the role of oil in the overall energy situation. The industrialized countries, and their quest for supply security, energy independence and the use of indigenous resources, have all contributed to a reduction in oil's share of energy consumption from 54.4 per cent in 1979 to 46.1 per cent in 1989. This development is likely to continue in the next decade at a slower pace, and oil could maintain a dominant share of not less than 40 per cent in the year 2000.

Judging by the current supply situation, the industrial countries seem better able to cope with short-term oil supply uncertainties. This is due to the diversification of their energy sources, restrained demand, the availability of ample stocks and improved supply flexibility. The developing countries, however, seem to be less able to cope with supply disruptions or uncertainties due to a lack of flexibility in their energy systems and the unavailability of capital to change this situation.

In the 1990s, oil-efficient technologies, and technologies related to alternative energy sources, will become more competitive provided that oil prices move out of the lows of the latter half of the 1980s. However, the penetration of such trends will not be as fast as in the early 1980s and oil will continue to be the major energy source worldwide.

Reconcile needs

This being so, the need for co-operation and understanding between major players in the oil market cannot be over-emphasized. Producers and consumers need to assure each other that their legitimate interests may not be as divergent as they first appear. Consumers need to secure oil supplies at reasonable prices. Producers need a stable oil market and prices which preserve their revenues in real terms and allow them to invest in future production. Surely these needs can be reconciled if the political will is there. Co-operation is also needed to optimize energy use without jeopardizing the environment. If the international community is to succeed in this effort, the producers' interests—in particular, the interests of those who depend largely on the sale of oil and other fossil fuels for their development—will have to be taken into consideration. ■

S. A. Al-Fathí is head of the Energy Studies Department of the Organization of Petroleum Exporting Countries (OPEC).

—Special—
Energy Today & Tomorrow

ATAS News

A Technology Assessment Supplement

No. 10/Fall 1990

Energy, Politics and Reality

The debate about energy has loomed large at local, national and international levels for two decades. But the nature of this debate has changed radically over that period. The 1970s emphasized an oil crisis that was more political than substantial. The major issue was who controlled oil, and at what price. In many countries, primarily the developed ones, this had a secondary effect of focusing attention not only on the accessibility but also on the durability of energy resources. A dimension of time—and of finiteness—was introduced. This in turn led to issues concerning the conservation of energy resources, particularly petroleum, both through more efficient burning of petroleum and coal and through the use of alternative fuels. And this led to a focus on technological innovation, including organizational (soft) technologies, such as energy demand management, as well as physical (hard) technologies.

Budgets based on Oil

In most developing countries, however, the energy crisis of the 1970s took on a very different meaning. Oil importers—and they comprise the majority of developing countries—suddenly accumulated massive debts as the price of oil rose. Development plans, based on budget projections calculated on "old" energy prices, often had to be abandoned. This was particularly true when these same development plans emphasized growth in areas (agriculture, industry) dependent on oil imports. Budget cut-backs also often meant a squeeze on scien-

(Cont. Pg. 2)

UNDP

Solar power is one of several energy alternatives for these villagers in West India

Request for Solar Energy Agency at United Nations

The German-based Association for the Solar Energy Era (Eurosolar) has formally asked the United Nations to establish an International Solar Energy Agency (ISEA).

It has been proposed that the new agency—modelled on the International Atomic Energy Agency—should:

- promote and support research into the development and practical application of renewable energy sources and the saving of fossil fuels and nuclear energies globally;
- provide materials and services, as well as equipment and facilities;
- foster the exchange of scientific and technical information on the state of the art of renewable energies and energy efficiency technology, as well as their practical application;
- promote the exchange and training of scientists, engineers and administrators working in those fields;
- advise on the financing of solar energy projects;
- purchase or construct facilities, installations and equipment necessary to the agency's tasks;
- counsel interested countries on how to build up their own production lines for renewable energy technologies.

Eurosolar is an association of experts from the fields of politics, industry, science and culture for the introduction of solar technology.

(Cont. Pg. 3)

Energy Politics and Reality
(Cont. from Pg. 1)

tific and engineering activities, where payoffs were considered to be long term and not clearly linked to development. Consequently, the same oil crisis which led to a push for technological innovation in developed countries had precisely the opposite effect in many developing countries, where the push was more frequently for daily survival.

The exception was in areas of energy intended for the disconnected sector. Here, where research has traditionally been more decentralized and less dependent on either government funding or imported resources, some countries were able to investigate the potential for developing new technologies using, for example, biomass, solar thermal, wind and mini-hydro energy. (More precisely, this was an innovation based on blending the results of new scientific and technological research with traditional energy technologies which have for centuries been based on the use of waste, sun, wind and water.) In some countries as well, where the S&T base was already sufficiently sophisticated, Governments gave strong centralized support to energy-related innovation, as was the case with Brazil and its alternative fuels and energy efficiency programmes. But these countries were the exceptions.

Shifting priorities

At the end of the 1970s the energy crisis diminished in importance. That is, the political considerations were altered and controlled. In developed countries some technological innovation continued for energy conservation and demand management—because certainly the crisis of the 1970s had shifted the energy world view, and because some market forces came into play to encourage it. But once the queues at the filling-stations disappeared, the individual drive to conserve all but disappeared as well.

For developing countries the situation did not change very much. The debt, after all, did not go away and development plans remained askew.

The late 1980s have reshaped the energy debate, perhaps for ever. The choices are defined as either living in

UNDP

Solar-powered street lights in New Delhi

a "greenhouse", or modifying both behaviour and technology. Although the underlying theme is again conservation, the terms are completely different. Developed countries cannot contain either the cause or the effects of the "greenhouse" by themselves. Their salvation is equally dependent on their own behaviour and that of the developing countries. The issue of energy, technology, efficiency/conservation, and demand management has been "universalized" and pushed to the front of many an international agenda.

Precisely because of its international importance, many of the organizations of the United Nations system are now addressing the issue of energy and climate/environment within the terms of their mandates. Foremost among these are the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO).

As focal point for technology assessment within the United Nations system, the Centre for Science and Technology for Development has been implementing a programme which attempts to assess new energy technologies, climate and development as part of an overall programme called "ATAS"—Advance Technology Alert System. Through ATAS, international and regional workshops are organized to discuss the policy questions which arise as a result of assessing new technologies and development. To date, these have included discussions of tissue culture, informatics, microelectronics and new materials in addition to energy technologies through the year 2020. The next exercise will address Environmentally Sound Technologies. The ATAS programme also produces a book-sized Bulletin which gives thousands of policy-makers, researchers, engineers and others access to the policy debates carried out through the workshops. And finally ATAS sponsors an international technology assessment network, TAN, composed of a select number of major specialized organizations worldwide who participate in and contribute to the workshops, the Bulletin, and regional and national initiatives to promote the utilization of the contents of the Bulletins in specific contexts.

Demand perspective

One of the major features of ATAS is that assessment begins from a demand perspective. Although the technologies themselves must be assessed, that assessment is only meaningful in the context of a specific problem, or issue, which itself arises from a demand. This is in marked contrast to much of the literature on energy-efficient technologies, where it is common to survey the supply and speak about how efficient or inefficient, costly or inexpensive, available or experimental various technologies are. These are all important questions, and must form part of the assessment. But they cannot be answered out of context. How expensive is "expensive", after all? How efficient is "efficient"? It depends upon the options available to meet a particular demand. ■

SOLAREX

Solar-powered automobile

Long-Range View on Energy Innovation in South-East Asia

By B. W. Ang

In many countries, both industrial and developing, increases in oil prices in the 1970s encouraged the development of new energy technologies, and the adaptation of existing ones in energy production, conversion, transportation and use. The primary objectives were the diversification of energy sources, and energy conservation.

Diversification takes the form of substituting non-oil energy sources, both renewable and non-renewable, for oil. Conservation relates to more efficient use of available energy sources. In many countries, progress on both fronts has led to quite substantial declines, or slower increases, in total energy consumption, and in oil consumption per unit of economic output.

Energy transition

In the South-East Asian countries of Indonesia, Malaysia, the Philippines, Singapore and Thailand, oil was the dominant energy source in the pre-1973 era. Oil's share in total commercial energy consumption was 91 per cent in 1972 for the region as a whole, but its share has since fallen to about two thirds. The rate of increase in the ratio of energy consumption per unit of GDP has slowed substantially from 51 per cent between 1960 and 1972 to only 12 per cent between 1972 and 1987. This transition would not have been possible without the successful adaptation of new energy technologies associated with alternative energy development, oil substitution and energy conservation. Nations in the region had had little experience with these technologies before 1973.

Oil substitution

Over the past 15 years the research and development of technologies associated with oil substitution and conservation have been actively pursued by countries of the region, and their capabilities have improved substantially. Projects related to energy development and use have been or are being carried out in areas including: biomass for heat and power; coal and gas technologies; fluidized bed combustion; solar energy; and cogeneration. In energy conservation, project areas include energy management and conservation techniques in buildings; vehicle fuel efficiency and traffic management; industrial energy management; cooking-stove performance analysis; and the optimization of insulation materials. Manpower training has also been actively pursued.

Many of these projects have been carried out on a regional basis and have promoted greater collaboration among the countries involved.

Regional cooperation

These experiences in South-East Asia and in many developing countries have shown that it is relatively easy to achieve oil substitution in a few areas of energy use such as electricity generation and in some heavy industries. However, it becomes increasingly difficult as one works through the list of possibilities. The same applies in energy conservation. Many measures which lead to improved efficiency are one-time investments or show diminishing returns on further investment. Compared with days past it is now more difficult to make inroads on both fronts, although with the experience of the early 1970s we are now in a better position to face the challenges presented.

Continued progress in both oil substitution and energy conservation will depend largely on the following factors:

—Future world energy prices, particularly oil prices;

—The security of energy supply;

—Investment in the development of alternative energy sources;

—Progress in energy technology development and adaptation.

Current events in the Middle East will provide new impetus to progress in oil substitution and energy conservation. It is significant to note that most developing countries have a greater control over energy technology development and adaptation than they do over international oil prices or the security of energy supply.

The successful development and adaptation of energy technologies would help to alleviate the undesirable consequences arising from uncertainties or major changes in energy prices and supply. And there is therefore a need to take a long-term view of energy technology innovations and to continue to give priority to the development and adaptation of those technologies. ■

Dr. B. W. Ang is a senior lecturer in the Department of Industrial and Systems Engineering at the National University of Singapore. For the past 12 years he has been actively involved in energy research, with emphasis on energy demand analysis and modelling, energy conservation and management, and energy in South-East Asian countries.

Request for UN Solar Energy Agency

(Cont. from Pg. 1)

Dr. Hermann Scheer, a Member of the German Bundestag, and Chairman of Eurosolar, advocated recently that the world should commit itself to a revolution in solar technology: "What is involved in this context is not just making use of solar technologies for the production of electricity, but also the use of solar energy to replace the main energy sources used in the world for transportation systems, industrial production and heating, i.e. fossil fuels. Solar energy must replace engine and heating fuels. This will be possible only on the basis of a solar hydrogen strategy. With solar hydrogen we will be able to store solar energy and, at the same time, make it available for any type of energy use." ■

Technology Access is Key to Success of Conventions

Sweden's Assistant Under-Secretary of Foreign Affairs, Ulf Svenson, told a recent CSTD in-house seminar that developing countries are demanding access to state-of-the-art technologies in return for their support for international agreements to safeguard the environment.

Mr. Svenson said that developing nations supported the concept of sustainable development but wanted the new generation of environmentally sound technologies, accompanied by intellectual copyrights on concessional or preferential terms. He said that poor nations would not accept the cost burdens of add-on technologies such as filters and would continue to resist global conventions on such issues as the ozone layer until questions of access to technology were resolved.

He cautioned that unless satisfactory steps were taken to bring the developing countries "on board" the various environmental conventions now in process would be largely irrelevant. ■

UN PHOTO

Mr. Ulf Svenson

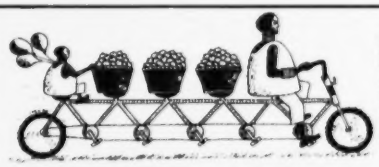
Rural Energy Saga of Developing Nations

Despite knowledge of the alternatives, the developing world's transition from non-commercial energy sources such as fuel-wood, manure and agricultural residues to hydrocarbons and renewables such as solar, wind, geothermal and hydroelectric, has been slow to materialize. Although the contribution of non-commercial energy as a proportion of total energy consumed in many countries has declined, overall consumption of forestry and other ecological reserves has increased. More than 75 per cent of the energy needs of rural populations in Africa, Asia and Latin America is currently met from non-commercial sources.

Programmes in support of new and non-renewable sources of energy have been promoted by the Food and Agriculture Organization (FAO) and by other United Nations agencies, but the combined impact of those programmes in the past decade has been marginal. The technologies for harnessing renewable energy sources, including solar, wind and biomass, remain way beyond the reach of rural people, and their dissemination will require major financial and other support from Governments. FAO has stressed the need for integrated energy planning in rural areas in order to satisfy demand at the lowest possible cost to users and the environment. It also promotes the use of mature and promising technologies, and supports programmes to augment fuel-wood consumption through its Tropical Forestry Action Plan.

Until now, however, most national agricultural, forestry and rural development plans have failed to approach rural energy needs in explicit terms. Planning has been hampered by a lack of statistical information and institutional capacity. The industrial, transportation and commercial sectors have over time been able to articulate their needs and negotiate responses from the appropriate energy authorities, but rural development agencies have tended to operate in a vacuum. One result has been the relatively low level of national energy investments in these areas.

Meanwhile, the developing world's inability to seize energy alternatives is mirrored in continued large scale deforestation, soil erosion and loss of agricultural fertility. ■



WORLDWATCH

Development on Wheels

Need a bicycle?

A Washington-based organization—the Institute for Transportation and Development Policy—has been working with the United States Peace Corps and grass-roots development groups to supply development projects with bicycles and maintenance skills.

The ITDP recognizes that while bicycles in the industrialized world are used mostly for fun, a bicycle can make an enormous difference to the economic fortunes of families and project workers in developing countries. In poor countries the bicycle provides affordable mobility essential to human needs.

The ITDP has donated more than 4,000 all-terrain bicycles to overseas development projects where workers in health, education and agriculture can now spend more time working than waiting for buses or other public transportation which sometimes never comes.

For further information, please write to: ITDP, P.O. Box 56538, Washington, D.C. 20011, U.S.A. Telephone: (301) 589-1810. Telex: 155217437 Attn: Mobility. ■

ATAS News is a regular supplement to the *Update* newsletter of the UN Centre for Science and Technology for Development (UNCSTD). Its objectives are to inform scientists and planners of CSTD's activities in technology assessment (TA), to serve as an information medium for the ATAS Technology Assessment Network (TAN) and to highlight the implications of new technologies for developing countries. *ATAS News* offers readers an open forum to address these and related issues at the national, regional and international levels. Submissions for publication are welcome.

Newsworthy articles, special reports, and photographs and other illustrative material should be sent to: ATAS Cluster, UNCSTD, 1 U.N. Plaza, N.Y., N.Y. 10017, USA. Telex 232422 UNHUR and 62450 UNATIONS. Cable, UNATIONS NEW YORK. Telefax (212) 9634116.

ATAS News is edited by Ian Steele. ■

Another Crisis Catches the World Napping

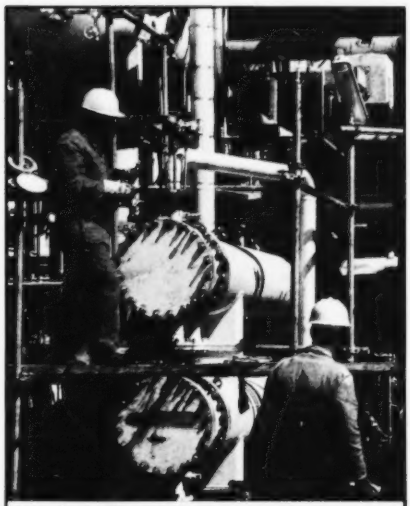
By Mohammed Yeganeh

The international community is experiencing another serious global energy problem, its third during the past two decades. The recent energy shock, like its predecessors, originated from the interruption of oil supplies from the Middle East. Previous energy shocks were followed by fluctuations in international energy markets, and contributed considerably to the world's economic ills, particularly to the worsening of economic conditions in most of the developing countries.

The effects of the recent shock will be felt in the months and years to come. And if current conditions governing the global energy sector are allowed to continue, there is the likelihood that the future will see frequent repetitions of serious energy-induced crises as well as increasing environmental degradation.

The energy crisis of 1973-1974 led to the quadrupling of crude oil prices in international markets, and the crisis of 1979-1980 was responsible for the tripling of such prices. The 1990 oil embargo—which has resulted in a shortfall of crude and refined petroleum exports of about 4.2 million barrels a day from Iraq and Kuwait, or 6.3% of the world's oil supplies—has led to approximately the doubling of crude oil prices. Specifically, the posted price of marker crude oil in the Persian Gulf, which stood at $2.90 a barrel in mid-1973, increased to $36 a barrel by the end of 1980. Then, after a number of sharp fluctuations, the posted price of marker crude declined to around $15 a barrel in mid-1990, and by late September 1990 was trading above $35 a barrel. As a result, the total value of global net oil exports jumped from $27 billion in 1972 to $362 billion in 1980, and then declined to $131 billion in 1986. Assuming that the recent price increases result in prices settling around $25 a barrel, the total value of the world's net oil exports will rise to about $250 billion in 1991 against $150 billion in 1988.

Sharp fluctuations in oil prices and temporary interruptions, or gluts, in oil supply have unfavourably affected both producers and consumers of petroleum and other types of energy. They have created great instability and uncertainty, weakened the implementation of energy policies and programmes, and discouraged conservation efforts as well as investments aimed at the development of additional energy supplies.



Iranian oil workers

Conservation worked

In the early years of energy shocks, the energy-importing industrial market economies, which are the world's major energy consumers, were generally successful in responding to the sudden sharp rise in oil prices, due largely to their advanced technological bases and ample financial resources and their willingness to make the necessary adjustments. This was done through the formulation and effective implementation of comprehensive energy programmes and policy measures, covering—*inter alia*—energy conservation and development and the use of alternative and indigenous energy sources. These efforts led to reduced energy consumption, particularly lower oil utilization, per unit of domestic output in these countries in the early 1980s, and contributed to the sharp drop in real oil prices in international markets in subsequent years.

Unfortunately, the improvement in the energy situation led to a relaxation of conservation efforts, a reduction of investments aimed at developing alternative energy sources, and a return to increasing reliance on oil imports for energy needs, reversing trends established between 1979 and 1985. As a result, the growth of inland energy consumption in developed market economies, which had declined from an average annual rate of 5.0% during 1960-1973 to a negative rate of –0.5% in the period 1979-1985, rose to 1.6% in the following years of 1986-1989. Changes in the annual growth rate of oil consumption in these countries were even more dramatic, amounting to 7.4%, –2.6%, and 1.7% in the corresponding periods respectively.

Poor remain most vulnerable

Energy-deficient developing countries, on the other hand, with some exceptions, not only continued to suffer from low economic growth (or stagnation) and high external debt burdens, but also failed to effectively implement appropriate energy policies and programmes that would have helped them cope with their energy problems and reduce their vulnerability to future fluctuations in energy markets. In view of their adverse economic conditions, the scarcity of financial and technical resources, and the higher priority given to competing demands, they could do very little to improve their energy sector. The dependence of these countries on imported oil has continued to increase and their share of oil imports in the world's total (excluding the former centrally planned economies) has risen from 10.4% in 1974 to about 22% in 1988.

At the same time, the growth rate of inland commercial energy consumption of developing countries as a whole, which averaged 5.3% per annum during 1960-1973 changed very little—declining to only 4.6% a year during 1979-1985, largely due to economic stagflation, before moving up to 5.5% per annum during 1986-1988. In

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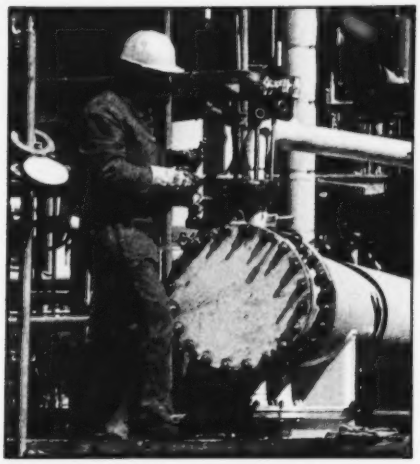
Oil crisis catches world napping
(Cont. from Pg. 5)



fact, the demand elasticity of commercial energy in these countries (the ratio of energy growth to GDP growth) which had averaged 0.95 in the period 1960-1973, rose sharply to 1.53 during 1986-1988. In developed market economies, the corresponding ratio, which was 1.06 in the period 1960-1973, declined to 0.08 during 1973-1985 and then rose to 0.55 during 1986-1988, equal to one-third of the ratio for developing countries.

Apart from these unfavourable energy trends, the world energy sector will have to cope with rising energy demand resulting from economic expansion, increased mechanization, and a growing world population. A recent projection by the United States Department of Energy estimates conservatively that, if the global economy grows at a rate of 2.45% annually through the year 2010 and if the average oil price rises gradually to between $25.90 and $47.40 a barrel by 2010 (at 1989 prices), energy demand will grow between 1.09% and 1.50% annually during the corresponding period. As a result, the world's energy requirements by 2010 will be 27%-39% greater than in 1988. This is equal to between 1,960 and 2,825 million metric tons of oil—raising the total global energy consumption to between 9,260 and 10,125 million tons of oil equivalent. It is expected that about 44% of the incremental demand will originate from the developed market economies, 37% from the developing countries, and the balance of 19% from the centrally planned economies of eastern Europe.

There is no scarcity of energy resources to meet such rising global demand. Our planet is endowed with huge and abundant sources of energy. They include coal, petroleum, natural gas, peat, heavy crudes, tar sands, oil shale, biomass, hydropower, nuclear energy, and solar, wind, geothermal and ocean energies. Some of these sources are renewable, others are not. They are not distributed evenly, however, and each nation will have a different energy mix.

Despite the potentials, the world continues to depend heavily on non-renewable supplies of fossil fuels—particularly the relatively low-cost oil and natural gas from a few regions, especially the Middle East. This heavy reliance on fossil fuels (amounting in 1988 to 31.2% coal, 41.5% oil, and 22.6% natural gas, of the total commercial energy consumption) is due to the fact that the development and utilization of most energy resources are constrained by economic, technological, environmental, and administrative factors. The available energies are often used in wasteful fashions despite efforts in many industrial countries to encourage efficient energy utilization.

Despite the formidable problems facing the world's energy sector, global efforts launched in the early 1980s to correct them have been largely abandoned. The large-scale and comprehensive energy investment programmes of the World Bank have been scaled down sharply. The Nairobi Programme of Action for Development of New and Renewable Sources of Energy in Developing Countries has practically come to a standstill. And, the technical assistance energy programmes and projects of the United Nations Development Programme (UNDP) have been drastically reduced. Many of the major industrial countries—after some initial efforts and successes—have largely given up on their energy policies and programmes, leaving adjustments in their energy sectors to the invisible hand of market forces. They have failed to give adequate attention to the fact that markets, without proper guidance, can rarely establish the desired equilibrium smoothly, particularly in areas where the gestation period of most programmes and projects is long, often exceeding a decade. The present situation calls for a revival of serious and comprehensive international dialogue and co-operation aimed at the promotion of energy stability and the alleviation of the world's energy problems. ■

Mohammed Yeganeh is an international economic and energy consultant.

Remember Nairobi '81

The Nairobi Plan of Action for the development and use of new and renewable sources of energy (NRSEs) was adopted in 1981 by an international community besieged by energy concerns very similar to those of today. However, when tensions eased, world energy policy went adrift, and has been largely unfocused since.

The office of the United Nations Director-General for Development and International Economic Co-operation is currently promoting the establishment of an international network of centres of excellence for NRSEs. It is also working with the newly organized United Nations Solar Energy Group on Environment and Development in preparation for the 1992 World Conference on Environment and Development. Particular attention is being given to the transfer of technology and to discussions on the establishment of an International Solar Energy Agency. (See story ATAS News Pg. 1). ■

Natural gas tanker

One U.S. View of Future Energy Imperatives

Motivated by strategic concerns for oil security and protection of the environment, the Atlantic Council of the United States released a policy paper earlier this year outlining a series of options for the 1990s.

The paper—"Energy Imperatives for the 1990s"—is the product of a special Working Group comprising 50 prominent energy stakeholders in the business, labor, consumer, environmental, academic, media and government sectors. They did not agree absolutely and one annex contains nine pages of comments and contrary opinions, but they did achieve consensus on a package of policy recommendations. The Working Group cautioned that an abundance of energy at modest prices had obscured emerging energy problems in the United States and other industrialized countries, and had provided a distorted impression of the situation in developing countries. It recommended, among other things, that Washington:

- impose a 50 cent per gallon user fee on petroleum transport fuels to finance the maintenance and improvement of transport systems and environmental clean-up;
- support the convention on global climate change being developed by the Intergovernmental Panel on Climate Change;
- encourage new arrangements between electric utilities and state regulatory commissions to assure adequate investment cost recovery;
- reconsider access to promising oil and gas prospects; and
- develop comparable environmental policies to ensure that countries bear an equivalent burden when adopting new environmental policies.

The Working Group observed that the 1990s could be expected to bring fundamental changes in the global interactions of energy supply and consumption, environmental concerns and economic growth.

"Finding a strategy to deal with these issues is a major challenge to the industrialized world and critical to the well-being of the developing countries," it stated. "Pragmatic and perhaps drastic policies will be required of Governments and international organizations . . . The goal is to provide the energy required everywhere for economic survival and growth, with due concern for environmental health and safety considerations. This issue is perhaps best outlined in the report of the United Nations World Commission on Environment and Development."

The Working Group stated that new technologies from R&D are fundamental to sustainable development but will not provide "magic" solutions. "Research and development is an evolutionary, not a revolutionary, process. . . ."

Energy efficiency

The Working Group also states that energy efficiency is essential to sustainable economic development and "must be recognized as a key part of any strategy to deal with urban air pollution, acid rain and global warming."

It is noted that the United States and other industrialized countries demonstrated their capacity to respond to energy crises in the 1970s and 1980s by reducing energy use by 20 per cent per unit of GNP. "In the period 1978 to 1986 the United States economy grew 19 per cent while energy consumption fell 5 per cent. This savings was equivalent to 9.4 million barrels of oil per day." The Working Group added that in the United States since 1973: new models of electrical appliances were 20 to 40 per cent more efficient; average automobiles consumed 30 per cent less gasoline; and aircraft were 40 to 70 per cent more efficient.

The Working Group concludes that by dealing with interrelated energy, economic, and environmental aspects of its recommendations in a co-ordinated way the United States can consolidate the gains of the past decade and embark upon an optimum strategy for the future.

For more information, please write to: The Atlantic Council of the United States, 1616 H Street NW, Washington, D.C. 20006, U.S.A. Telephone: (202) 347-9353. ■

The Brazilian Experience

Brazil has developed the world's largest alternative transportation fuels programme and has been reminded once again of its value in uncertain times. As oil prices rise above $28 a barrel, ethanol becomes an attractive substitute for gasoline.

The country has some 600 distilleries nationwide, capable of producing about 16 million m^3 (4.2 billion gallons) of ethanol a year from sugar cane—a traditional crop which fuels all 12 million automobiles nationwide, either as neat ethanol or in a gasoline blend.

The most obvious benefits of ethanol are that it is:

—the only commercially available transportation fuel that totally recycles carbon dioxide;

—a reliable source of domestic fuel;

—a cleaner source of transportation energy;

and that it provides:

—savings in foreign exchange;

—a hedge against low international sugar prices;

—market incentives to develop technologies for improved sugar-cane yields, more efficient conversion of sugar-cane juice and molasses into ethanol, and higher engine efficiency;

—export revenue;

—jobs and security in rural areas.

Fuel costs are of course a major incentive. As of January 1990, retail prices for automotive fuels in Brazil at the official exchange rate were: US$0.87 per litre (US$3.29 per gallon) for gasoline which can contain up to 20 per cent ethanol by volume; $0.66 per litre ($2.50 per gallon) for neat ethanol, and $0.42 per litre ($1.60 per gallon) for diesel fuel. ■

WORLDWATCH

Missions to Strengthen Endogenous Capacity

CSTD recently completed preparatory missions aimed at strengthening the endogenous capacities of Pakistan, Jamaica and Cape Verde in the areas of science and technology. The principal objective of the missions was to lay the groundwork for dialogues among the various stakeholders in the economy at large regarding priorities for science and technology for development.

Pakistan

The mission to Pakistan (9–18 July) visited a number of research and development (R&D) institutions at the request of the Ministry of Science and Technology (MOST) and identified a major gap in communications between the private sector and those who manage the nation's S&T endeavours. The mission reported that Pakistan has a strong national R&D infrastructure and vast industrial and agricultural sources of supply and demand, but noted that a large share of the country's resources were absorbed by debt servicing and military expenditures, leaving little for other development endeavours.

Jamaica

The mission to Jamaica (3–9 June) found that national policy was essentially in line with the proposed CSTD project. A National Science and Technology policy adopted by Parliament in April explicitly proposes the establishment of a "high-level, broad-based, cross-sectoral national advisory committee" representing people from different sectors of the economy.

Cape Verde

The mission to Cape Verde (14-23 June) was impressed by the country's small but well-managed economy. Although ravaged by drought, Cape Verde has encouraged a labour force which is skilled in metal- and woodworking and ship-building. Members of the mission felt that skills acquired through established apprenticeships provided a basis for the industrial development and technical transformation of the country.

The mission noted the country's reliance on expatriates for foreign capital (twice as many Cape Verdeans live outside the country as at home) and observed that new generations of expatriates could not be relied on to backstop the economy with their remittances forever. However, members of the mission also noted that current expatriate support extended beyond cash to include vital technical, commercial and business links with the outside world.

Given the severe limitations on natural resources in Cape Verde, it was felt that the country must soon find a niche in world markets which could be serviced through the development of its human resources.

The mission held extensive discussions with senior Government oficials, including the Prime Minister and other ministers, and visited some 25 Government departments, public and private enterprises and R&D institutions. ■

An expert meeting devoted to Sustainable Development/Environmentally Sound Technology Assessment (ESTA) is planned for 14 November in New York.

ESTA is the substantive theme of the 11th session of the Intergovernmental Committee on Science and Technology for Development which will be held in New York from 22 April to 3 May, 1991.

The November meeting will be co-sponsored by the Friedrich Naumann Foundation and CSTD, and will cover the essential elements of the ESTA concept. ■

Meetings

October

29 October–7 November (Geneva) Second World Climate Conference.

November

12-14 (Harare, Zimbabwe) WEC Southern East African Regional Energy Forum. Sponsored by World Energy Council.

14-16 (Barcelona) Impact of Biotechnology on Health Care Services.

December

2-7 (Belem, Brazil) Creative Financing for Environmentally Sound Technologies. Sponsored by the Brazilian Government, Friedrich Naumann Foundation, CVRD, UNDP and FSTD.

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"...A periodic newsletter to keep national authorities, United Nations organizations and intergovernmental and non-governmental organizations informed of the progress made and related developments regarding the implementation of the Vienna Programme of Action" (IGC resolution 5(II)).

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